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AUTHOR Breisch, Linda; Medina, Noe
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ABSTRACT

In the summer of 1993, more that 55 educators from across the United States attended The Institute for Learning and Teaching (TILT) at the Massachusetts Institute of Technology (MIT) in Cambridge (Massachusetts). Teachers, school administrators, and their champions in the community joined MIT students, professors, and professionals from Boston-area businesses and organizations in a professional development experience. Planning and implementing the TILT model had six phases: evaluation and planning; recruitment of community teams; training of TILT staff; conducting the 3-week residential session; supporting teams throughout the school year; and supporting teams long term. TILT offered a unique combination of professional development linked to adult learning; teamwork and collaboration; and integrated, technology-based, multidisciplinary projects. TILT conveyed the concept and importance of understanding systems to its participants through a repeated emphasis on mechanical, organizational, and technological systems. This report describes the TILT program, staffing requirements, planning and implementation, and programmatic components and offers suggestions for duplicating the program elsewhere. Appendixes include a description of the historical background of the program, an application form for attending the program, and actual documentation and results from the 1995 program. (NAV)

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TILT

TILT

The Institute for Learning and Teaching

Professional Development of Community-Based Teams

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Get Involved

To apply or contribute to The Institute for Learning and Teaching at MIT, or to receive more information, please call or write to:

Linda L. Breisch
TILT Communications Manager
Massachusetts Institute of Technology
Room 20B-141
77 Massachusetts Avenue
Cambridge, MA 02139-4307

(617) 253-1559 **phone**
(617) 253-5363 **fax**

E-mail: fischer@mit.edu

World Wide Web:
http://web.mit.edu/tilt/www

Debra Aczel

Linda L. Breisch

Chris Craig

Alan Dyson

Kelley Fischer

Matthew Goode

Leon Trilling

The Institute For Learning & Teaching
School Reform Through
Community-Based Teams

Massachusetts Institute of Technology

By Linda Breisch and Noe Medina

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About the Plan

Plan for Social Excellence, Inc. is a not-for-profit organization which utilizes private funds to create or support innovative pilot projects in education in the United States.

The Plan supports programs that are fluid and responsive to the needs of individual schools and communities rather than programs that attempt to address these needs through a system-wide process of reform. This approach allows the Plan and its program participants to circumvent overburdened school bureaucracies in order to attack the roots of problems that prevent students from succeeding or excelling in their studies.

This "grassroots" approach to educational enrichment and reform is part of a growing trend among educators, community leaders, and parents, many of whom have been frustrated by a lack of opportunities for initiatives at the local level. This local emphasis ensures that the reform measures are appropriate to the populations and circumstances in which they are developed, and that these programs benefit the school, the district and the community in significant and lasting ways.

About the Authors

Linda Breisch has been a member of the Design Team for The Institute for Learning and Teaching (TILT) at the Massachusetts Institute of Technology for two years. She recently completed a 14-minute videotape about the TILT program for Plan for Social Excellence.

Ms. Breisch has a B.S. in Biological Oceanography from the University of Michigan and is currently in the Graduate Program in Communication Studies at Emerson College in Boston.

Noe Medina is an independent consultant who works on program evaluation and development for school systems, government agencies, and nonprofit organizations. For three years, he has conducted the evaluation of The Institute for Learning and Teaching.

Mr. Medina has also served as the education director of the Children's Defense Fund as a legislative aide to Senator Edward Kennedy of Massachusetts.

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The Institute For Learning & Teaching School Reform Through Community-Based Teams

In the summer of 1993, more than 55 educators from communities across the United States came together on the campus of the Massachusetts Institute of Technology to begin a new and promising experiment to promote school change: The Institute for Learning and Teaching, or TILT. Teachers, school administrators, and their champions in the community joined MIT students, professors, and professionals from Boston-area businesses and organizations in a professional development experience unlike any typically offered teachers. TILT offers a unique combination of professional development linked to adult learning; teamwork and collaboration; and integrated, technology-based, multidisciplinary projects—skills to help teachers and students succeed in today's and tomorrow's world of education and employment. Because its key features distinguish it from the majority of professional development programs, the TILT model holds considerable promise for promoting new approaches to learning and teaching that will better serve the needs of our children as we enter the twenty-first century.

Explanations and theoretical approaches; the humanistic environment and integration of theories; how the teacher is a learner and becomes sensitized to students needs; understanding the self; letting go of negative images that inhibit the learner from learning and feeling as a valued being. All these things came together to make me think differently and approach teaching from a different angle.

— TILT Participant (1994)

Dimensions of Change

"As individuals, we must ultimately attribute the cause of educational performance to one of two sources: either we believe that the problem is due to design, or to execution," stated Dr. Robert Branson in a recent and insightful examination of restructuring in public school systems. "Either the current school process is adequate if properly implemented, or the process is inadequate, no matter how well implemented." The evidence weighs heavily on the side of the latter conclusion: no amount of tweaking the educational system as it now exists will improve student academic performance to the levels needed in today's world, let alone tomorrow's.

- Curriculum and scheduling organize student learning around distinct subjects (science, mathematics, reading) while real world experiences suggest that people naturally study several subjects simultaneously, or they study concepts related to particular themes.

- Instructional practices continue to treat intelligence and learning styles as uniform, even though recent research has suggested the existence of multiple intelligences and learning styles.

- Teaching strategies continue to emphasize a finite transmission of knowledge, rather than encouraging and enabling students to become life-long, self-motivated learners.

"Concepts governing the structure and organization of schools reflect neither the needs of modern society nor the results of contemporary research."

- The operating structures of schools promote the isolation of teachers in their classrooms and of faculty in their school building at the same time that business, industry, and society is emphasizing the need for increased communication and collaboration.

This evidence suggests that the concepts governing the structure and organization of schools reflect nei-

ther the needs of modern society nor the results of contemporary research. Schools still follow the scientific management model (espoused by Taylor) that was popular at the beginning of this century. In this model, which has its roots in the military, decision making is concentrated at the top of a many-leveled, inflexible hierarchy. Modern businesses and organizations are finding that to respond to rapidly changing markets and environments, they must abolish such a rigid structure. To survive, companies are learning to share information, decision making, and some power at all levels of organization. Schools face similar pressures to change, to be flexible. The challenge for them, as for businesses, is the lack of precedents to guide them.

Current concepts about how schools organize and operate are obsolete. Traditional notions about instructional practices, professional development, curriculum, scheduling, school management, the school's role within the community, and the community's role within the school must alter to fit the realities of the modern world. Furthermore, effective change cannot occur in one area at a time; it must occur in several dimensions simultaneously.

TILT helps educators become more flexible thinkers by exploding the barriers that typically limit discussions about schools and how they should look. It uses a model of community participation to promote and support innovative learning and teaching in K-12 schools and the methods of systems analysis to advance school reform. It engages community-based teams of teachers, school administrators, and their champions (for example, parents, school board members, university specialists, or industry representatives) from all over the United States in a year-long professional development program.

During an initial, intensive three-week session, teams engage in activities, exercises, and technical research projects that help them think about the way they look at and carry out learning and teaching. The technical research projects focus on a technology common in most communities, such as how water gets to the

household faucet. Over the course of the year, teams use a framework of systems analysis to develop integrated studies, foster teamwork, embrace multiple learning styles, establish community partnerships, and infuse technology-centered study into professional development.

Businesses routinely provide their employees with professional development that builds their individual and interpersonal skills. Many such programs may have nothing to do technically with the employee's specific function. For example, entire workshifts of employees may learn how to work together better and communicate more effectively rather than merely learn more techniques to perform their specific job. Similarly, the TILT model focuses on the individual, personal growth of members of a team; it does not attempt to provide teachers with content information that can be directly applied in the classroom. Teachers need to be supported in their development of new skills as society shifts to a definition of education that is based on what is learned rather than on what teachers attempt to teach.

The combination of five key features distinguishes TILT from other professional development programs: its instructional approaches; its linking of professional development and adult learning; its emphasis on teamwork and collaboration; its technology-based, multidisciplinary projects; and its focus on recognizing, understanding, and influencing the relationships between all components of the educational system.

"Teachers need to be supported in their development of new skills as society shifts to a definition of education that is based on what is learned rather than on what is attempted to be taught."

Instructional approaches in TILT reflect the multidisciplinary, inquiry-based, learner-centered, hands-on practices identified in contemporary educational research. These approaches are distinctly different from those which characterize most traditional classroom instruction, the "chalk and talk" or teacher as expert dispensing knowledge to passive receptors.

Evaluation results from the first two years of TILT participants indicate that the model has effectively demonstrated these teaching approaches to participating teachers. Overall, 84 percent of teachers reported using specific TILT activities as models for lessons in their own classrooms and restructuring curriculum and teaching approaches to reflect those used during the TILT residential session. Almost half of them reported using such strategies for the first time. The others reported that the TILT experience refined or expanded their use of these strategies. Moreover, both new and veteran teachers reported such changes. These results suggest that the TILT model is an effective means for remolding instructional strategies and teaching practices—even among veteran teachers.

Professional development and adult learning are inseparably linked in the TILT model: learning and teaching are two sides of the same coin. To be effective teachers, educators must once more become passionate learners. At the same time, their learning (like their teaching) must emphasize a collaborative process with the learner at the center of the process and responsible for doing, not just observing the "experts" as they work or demonstrate.

The model explicitly prepares and supports community-based teams to use TILT activities in a professional development program in their own school district. According to evaluation results, 14 of the 17 teams who participated in TILT during its first two years reorganized TILT strategies and specific TILT activities to conduct programs for their colleagues. These strategies and activities appear to have been successful in disseminating TILT's instructional practices to a second generation of educators within the participating schools and communities.

The TILT experience has required me to think about the education system in a far different light. I was content last year to isolate myself....I now see that in order to best help my students I need to be in the forefront of change. As you know this is a great deal of work. However, I know that it can be done and I want to thank you for allowing me to see the possibilities.

— TILT Participant (1995)

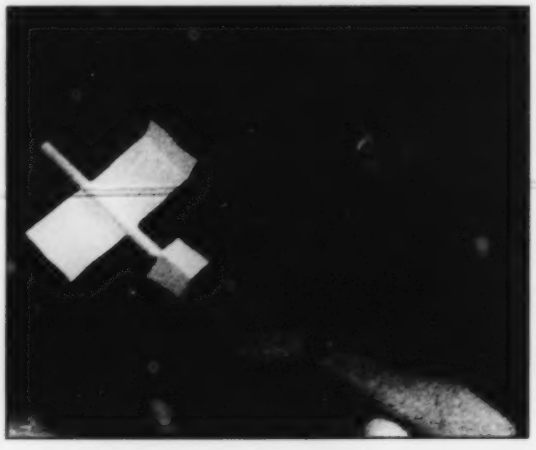
Team work and collaboration are essential to provide the support and resources necessary to sustain lasting change. The TILT model emphasizes building bridges between individuals both within schools

(teacher to teacher, and teacher to administrator) and between schools and community institutions (teacher to business, administrator to museum, teacher to museum, etc.—the list could be nearly endless). The TILT experience is designed to foster cooperation and teamwork among individuals and organizations by explicitly increasing team building, communication, and collaboration skills and by providing participants with extensive opportunities to practice these skills. This emphasis stems from several factors including the need to:

"The TILT experience successfully embeds the concept of collaboration and teaming among its participants."

- Break down staff isolation within the school and foster a collaborative operating and management style.
- Identify common challenges and problems and share effective solutions.
- Mobilize diverse resources within a community to support the effective operation of the schools.
- Ensure that the educational experience reflects and prepares its students for the "real world."

Evaluation results indicate that the TILT experience successfully embeds the concept of collaboration and teaming among its participants. Three-quarters of the teams of administrators, teachers, and community representatives created through TILT have continued to meet after their year-long commitment to the program has ended. Through their efforts to advance the activities begun during TILT participation, these participants report a better understanding of how to work and communicate in teams and, more important, why teaming is valuable. At the same time, TILT participants report reaching out to incorporate community resources and community-based activities in their curriculum design and instructional practices. Finally, the community institutions represented on the community-based



TILT teams have consistently expanded their involvement with the participating school or school system and the mission of educational change. For example, they have helped to place students in business internships, donated equipment to schools, or joined the committees that develop curriculum.

Team research is practiced on **technology-based projects** for three reasons. First, such technologies blend the sciences, mathematics, humanities, and social studies. "Technology" in TILT is defined as the process that uses the ideas, scientific knowledge, and perceived needs of a culture to shape the environment around it. Different cultures practice technology in different ways, based on the knowledge that each has. Second, MIT has experience with these technologies and a wealth of information to share about them. Third, a technology-based focus for projects provides teams with a useful tool for establishing communications with and mobilization of their local resources. When approached to help teams in a technical research project, businesses have a defined role and a recognized expertise that they can contribute to the educational process. This connection can serve a steppingstone to more extensive, mutually beneficial exchange as businesses and schools begin to understand each other's needs and resources.

A system wide point of view integrates instructional approaches, professional development, teamwork, and community-based technology into a broad, systemic effort. Schools are a complex and self-regulating structure that inevitably resists any type of reform. Changes in any one element of a structure are generally countered and minimized by the other elements. Some schools, like those in urban areas, are large systems that themselves are a component in an even larger system. They face additional rigidity in structure and resistance to change. Any reform plan must include consistent and mutually reinforcing changes in many elements of the system.

TILT conveys the concept and importance of understanding systems to its participants through a repeated emphasis on

mechanical, technological, and organizational systems. The evaluation results indicate that through their TILT experience more than half of participants come to recognize the relevance of thinking about systems and the interaction of all their components. About one third attain a level of understanding sufficient to accomplish change.

Flexibility is Key

Another key feature of TILT is its responsiveness to participant reactions and its ability to change, to readjust the model and its goals. TILT's model remains relevant to educators because their comments and responses initiate changes to the program. The formal evaluation is, therefore, not only documentation for the TILT program, but also a source of information and ideas for design and direction of the model. A Design Team of MIT faculty, staff, and public school teachers plan and guide TILT based on personal experience, reports from the evaluators, and ideas that emerge in debriefing sessions with participating teams. Comments from teachers, administrators, and community representatives are seriously considered; these have led to major changes in the model during its three years of operation.

"Participants come to recognize the relevance of thinking about systems and the interaction of all their components."

For example, the formal evaluation of TILT's inaugural year uncovered participant criticism that the pace of the 1993 program did not allow sufficient time for participants to reflect on or discuss ideas, behaviors, and processes during the three-week residential session. The need for more processing and reflection time remained a major concern for participants even a year after their participation: 44 percent cited more time for reflection as the major need for TILT. The evaluators, therefore, recommended "a redesign in the schedule...to incorporate greater opportunities for small and large group discussions, reflection activities, and processing of experiences."

As a result, in 1994 TILT scheduled debriefing and reflection opportunities after each activity. The formal evaluation of that year's program found that these opportunities for discussion helped participants better understand the themes and messages of each activity and encouraged them to conduct the self-examination necessary for the internalization of TILT strategies and approaches. The quality of the debriefing opportunities was not consistent, however, and the evaluation pointed out the need for more personal, individual reflection. In turn, the TILT model of 1995 was altered to allow more personal reflection time as needed. Guidelines were issued to the staff facilitating the group process of each team, and each facilitator received a guidebook with specific questions to prompt a discussion after every activity. The 1995 formal evaluation reported that participants this year rarely commented on debriefing and reflections, suggesting that "these elements have become an unobtrusive extension of the formal TILT activities."

Very few professional development programs are so willing to incorporate participant feedback and commentary. At each point in our learning process, we were given opportunities to challenge, extend, and reinforce the educative activities.

— TILT Participant (1995)

A more detailed discussion on the evolution of TILT and how comments and responses from participating teachers have molded the program is included in the appendix.

Staffing TILT

Design Team. At the core of the TILT model is the Design Team, whose membership fluctuates over time, further reflecting the dynamic nature of TILT. For example, a founding member of the Design Team is currently designing a model for a high school with former participants. He no longer participates regularly on the team, but rather plays a consultant role.

TILT Design Team Roles and Time Commitment, 1995

Director	Full-time
Secretary	Full-time
Faculty Member	Part-time
Communications	Part-time
Teacher Representative	Part-time
Technical Lecturer	Part-time
Financial Officer	Part-time

New members with various expertise have been added. The 1995 Design Team now has seven members, only two of whom are full-time TILT employees: one is the director; the other is the secretary. All the remaining members work 40 percent or less for

TILT. Because TILT is based at a university, one can "purchase" percentages of an individual's time; the remainder of the individual's time is generally picked up by other projects and accounts.

The Design Team as a whole analyzes each year's outcomes and plans for the next. Each member, however, brings different talents and a specific strand of knowledge to the team. The team always includes one practicing teacher who has been through the program. That role is currently filled by Matthew Goode, a teacher in the Boston Public Schools. The teacher perspective is also provided by another member of the Design Team, Alan Dyson, who is a former teacher with 15 years of experience. He conducted research for five years at the Educational Development Corporation, thereby gaining an extensive knowledge of educational systems nationwide. Dyson was also a founder and the first Executive Director of the Cambridge Partnership for Public Education, Inc. He brings his expertise in forging partnerships with industry to his role as the director of the TILT program.

Professor Leon Trilling fulfills another important role on the Design Team. He is the liaison between TILT and his colleagues on MIT's faculty, who help him to design many of the technical research projects for TILT's residential session. As one of the founders of the Metropolitan Council for Educational Opportunity, or METCO, program, he brings to the Design Team a wealth of experience in providing educational opportunities for underrepresented minority youth. He also brings experience from having directed the Second Summer Program at MIT, which continues to place at least 30 minority students in industry engineering jobs at the end of their freshman year. Since 1990, Professor Trilling has led MIT's participation in the Coalition of Schools for Excellence in Education and Leadership, or ECSEL, outreach program, which focuses on the professional development of high school teachers, many of whom teach in schools with large minority enrollments.

Other TILT staff include Linda Breisch who is responsible for

communications in print, video, radio, and electronic media. Christopher Craig orchestrates the facilitators' training, designs the technical research projects with Professor Trilling, and develops follow-up activities for teams during the ensuing school year. Kelley Fischer coordinates logistics and office support to ensure that the program runs smoothly. Debra Aczel handles the financial operations of TILT.

Each Design Team member takes an assignment to monitor and assist one or more community teams during the academic year session. In general, the Design Team member facilitated the team or teams during the summer residential session.

Facilitators. Another set of staff crucial to carrying out the TILT model are facilitators who are assigned during the residential session to assist and support each community team in TILT activities. Facilitators provide technical or logistical assistance, focus the learning process of participants, and help groups understand and weather the inevitable cycles of group dynamics. They are not mentors, nor are they "experts": their role is to help team members learn how to work together, forging a group of individuals into a functioning team that is capable of achieving the goals it sets for itself during the upcoming year.

TILT employs two categories of facilitators: MIT undergraduate students recruited from MIT's Integrated Studies Program or the MIT-Wellesley Undergraduate Teacher Education Program, and a group of more experienced individuals who are either alumni from past TILT programs, members of the Design Team, or professionals from other colleges, businesses, and industries in the Boston area. Each participating community team is assigned a pair of facilitators (one student and one adult professional). Given their familiarity with the MIT campus and with the use of computers, the MIT students generally provide most of the technical and logistical support for the teams. Although the primary focus of

"Facilitators provide technical or logistical assistance, focus the learning process of participants, and help groups understand and weather the inevitable cycles of group dynamics."

the facilitators' work occurs during the summer, some facilitators provide continued assistance to "their" teams during the following school year. This assistance complements the assistance provided by the Design Team.

Consultants. The third category of TILT staff are specialists or consultants contracted to perform a specific function during the residential session. TILT relies on two types of specialists. One type conducts activities designed to help participants build skills in teamwork, learning styles, and systems analysis. For example, TILT contracts an outside consultant to lead the skill-building sessions on learning styles and communication strategies. The other shares his or her expertise on topics relevant to the technical research project of each community team. In many instances, these specialists are MIT faculty, staff, or advanced degree students. Before the residential session begins in July, the TILT Design Team arranges to have these specialists available for tours and consultations during the week of team research. For example, a team assigned a technical research project that focused on airport security would have prearranged access to security professionals at Logan International Airport and to an MIT faculty member whose expertise is air transportation security systems.

Evaluators. The final category of TILT staff consists of the independent evaluation consultants who contract with the TILT Design Team to provide a third-party assessment of the implementation of TILT and its effect on participants. The evaluation team provides regular oral reports and formal written reports to the Design Team, which incorporates the results into its subsequent planning process. The evaluation, therefore, serves as more than documentation of the model; it is a source of ideas for future program directions.

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Planning and Implementing the TILT Model

The TILT model has developed its programmatic activities to reflect a series of conceptual strategies. The dynamic nature of the model means that these activities may be modified in response to changes in the educational reform context and in the resources and challenges of participating schools or communities.

"The TILT model embodies the concept of change, not only in its goals and outcomes, but also in its structure."

Conceptual Strategies

Dynamism. The TILT model embodies the concept of change, not only in its goals and outcomes, but also in its structure. Two basic realities influence TILT's nature and operation. First, TILT is attempting to "hit" a moving target. Educational change is not a static concept, but a continual response to research findings, practitioner experiences, and societal needs. Second, TILT attempts to serve individuals, schools, and communities that have different assets, situations, needs, and goals. To be relevant and adaptable to local circumstances, the TILT model employs a general set of goals, principles, and activities, and adapts it as appropriate. Similarly, the design of the evaluation is dynamic, changing to reflect modifications to the model. The Design Team is responsible for maintaining program continuity, while infusing dynamism in the model. TILT's ongoing planning and assessment structure is designed to maintain this balance between continuity and change.

Modeling the Process. TILT teaches participants by modeling desired behaviors and demonstrating activities throughout the residential session. TILT promotes:

- the use of new curriculum content, lessons, and instructional practices for elementary and secondary students by organizing TILT activities around these content, lessons, and practices

- the use of new strategies for professional development by employing those strategies in the design of its activities for TILT participants

- the use of teaming and community collaboration by using such concepts to plan, design, and conduct the TILT activities

- a focus on systems and systemic change by taking apart and analyzing a variety of systems—both mechanical and institutional—during its residential session.

Educational Approaches. Four distinctive factors characterize TILT's educational approach and distinguish it from that of more typical educational programs, either for children or for adults: the integration of theory and practice; the development of necessary skills and knowledge; learning based on "real world" topics; and the emphasis on communication and cooperation.

- Activities emphasize the **integration of theory and practice,** recognizing that theory without practice is sterile and abstract, while practice without theory lacks grounding.

- Activities develop the **necessary specific skills and knowledge.** Team building requires the development of teaming skills; systems analysis requires a grasp of systems and how they operate; and community outreach requires an understanding of collaboration and how it can be made to succeed.

- Learning is built around **real world topics** and ignores the artificial and somewhat arbitrary barriers between academic subjects, between vocational and academic education, or between learning and teaching.

- Activities emphasize **communication and cooperation.** Only community-based teams, not individuals, may participate in

TILT. Activities during the residential session develop team-building skills in participants, provide experience in planning and working together, and demonstrate the value of involving community institutions and drawing upon community resources in learning and teaching.

Programmatic Components

Planning and implementing the TILT model has six phases: evaluation and planning; recruitment of community teams; training of TILT staff; conducting the residential session; supporting teams throughout the school year; and supporting teams long term.

Phase 1: Evaluation and Planning

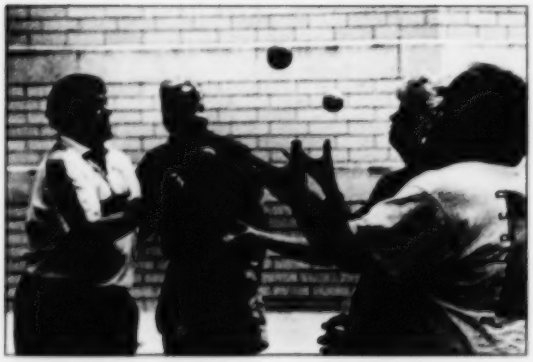
Evaluation of the TILT model and planning for the upcoming year begin in late autumn and continue into the spring. During this time, the members of the TILT Design Team meet regularly (once a week early in the year, increasing to twice a week during the two months immediately preceding the residential program) to develop changes in the program's structure or planned activities. Late in March, the Design Team goes on a three-day retreat to discuss, without interruption, the upcoming technical research topics and finish the final planning for the residential phase that begins in July.

Program changes in TILT stem from the assessment of the previous program cycle which runs from July to the following June. Assessment information comes from four sources:

- Personal observations and conclusions of the Design Team members.
- Observations and conclusions of the TILT facilitators obtained during debriefings of the previous residential session.

- Observations and conclusions of previous TILT participants obtained informally during conversations and site visits and formally during a debriefing session conducted at MIT in the autumn.

- Formal recommendations of the evaluation team based on its assessment.



Phase 2: Recruitment of Participants

The second phase of the TILT model overlaps the first. General recruitment efforts for community-team participants in TILT begin during the autumn. However, these efforts become significantly more intensive and focused in the winter and culminate in the weeks just prior to the residential session with the final identification and acceptance of community teams for that year.

Recruitment follows several avenues. Design Team members and TILT facilitators disseminate information of the program and encourage interested individuals to consider identifying a team for participation. Institutional partners and allies within MIT, the Massachusetts Department of Education, and funding organizations also identify and encourage potential sites to apply for participation. For example, both the National Science Foundation-funded statewide systemic initiative in Massachusetts, called PALMS, and the Massachusetts School-to-Work Program have identified teams for TILT. In many cases, word of mouth brings TILT to the attention of communities and potential funders. An individual might then champion the idea of sending a team to TILT, drawing upon the TILT Design Team for presentation support.

Every community is required to follow the same procedures and meet the same criteria. Specifically, interested communities are required to:

- Obtain $40,000 in funding from local or school sources. To

date, TILT has been able to raise money to support many of the teams; each team, however, is still expected to secure $5000 from local or school sources.

- Identify seven individuals who will attend the three-week residential session as members of a team.

- Submit a formal application on behalf of the entire team (a copy of the application is included in the appendix).

Only teams that meet all three criteria are considered for participation. TILT initially advocated a team composition of five teachers, one administrator, and one champion from the community, but recently it has begun to experiment with other models. One alternative is to create a team of individuals who are responsible for developing professional development strategies to accommodate a specific program or alliance within a broad region. In Massachusetts, the School-to-Work Program fielded such a team in 1995.

TILT itself does not evaluate the credentials of potential team members. The Design Team has generally worked top-down, piquing and sustaining a superintendent's interest in the TILT program and leaving it up to him or her to determine the team's composition. TILT does stipulate that team composition reflect the ethnic diversity and male-female ratio of the school district.

Each team is awarded $10,000 upon completion of the residential session. Team members must reach a consensus on the manner in which this grant will be spent. In addition, each individual on the team is eligible for continuing education units and, if chosen, professional development points (through MIT) that can be applied toward his or her recertification requirement.

Phase 3: Training TILT Staff

During the week immediately preceding the residential session, TILT conducts a three-day orientation and training session for all its facilitators. This phase of the TILT model is another

example of the Design Team's commitment to evaluation and planning as a means of improving program design. Originally, the model did not include training for TILT facilitators. This component was added after TILT's first year of operation based on recommendations by the evaluation team.

"Facilitators experience shortened versions of the same exercises through which they will guide participants."

Facilitator training serves four purposes. First, it familiarizes facilitators with the goals of TILT and what TILT expects of them. Second, it introduces facilitators to the schedule of activities for the three-week residential session and describes the purposes and intent of each activity. Facilitators experience shortened versions of the same exercises through which they will guide participants. Third, it helps build and provides practice for the skills needed by facilitators to carry out their roles during the residential session. Staff learn several techniques for guiding experiential education. Finally, it provides the opportunity for the two facilitators assigned to each community team to meet and develop a positive and effective working relationship.

The evaluation results of the facilitator orientation and training sessions conducted during 1994 and 1995 have been positive. Whereas in 1993 TILT participants suggested that "guides [facilitators] need more consistent directions on their roles" and facilitators themselves confessed feelings of inadequacy regarding their skills and preparation, responses from both participants and facilitators since the implementation of training has identified the facilitators' role as the "most effective element of TILT." Facilitators have reported that specific activities during training are valuable, and student facilitators in particular find the opportunity to preview planned activities and practice facilitator skills indispensable.

Phase 4: Residential Session

Formal involvement of the participating community teams with TILT occurs during the residential session which is conducted on MIT's campus during the last three weeks in July. It

represents a period of intensive preparation, using explicit training and opportunities for practice, for the members of each community team to carry out program goals in their communities.

Three categories of activities are integrated during the three-week residential session: personal professional growth experiences, team technical research projects, and designs for community plans of action.

One of the most important professional changes I've made is the way I view my students...Last year when I taught my ninth grade students..., I only used techniques that were comfortable for me. Now I do a better job of taking their needs into consideration.

— TILT Participant (1995)

Personal Professional Growth. Working effectively on a team requires an understanding of and appreciation for the preferred methods of communication and learning of all team members. Are they tactile, aural, or visual communicators and learners? Early in TILT, participants discover through a professionally analyzed learning survey how they themselves prefer to learn and communicate, and they consider the implications of this self-awareness on their professional and personal lives. They examine how their learning style affects decision making, problem solving, interpersonal communications, and team building in a range of different experiences..

Simultaneously, teams engage in a combination of physical, Outward Bound-type, problem-solving exercises; engineering design exercises; and simulation exercises that provide them with varied opportunities to experience and discuss the challenges of working as a group. In several periods of reflection built into each day, facilitators refocus participants' attention on the process through which they are going. Teams also learn the concepts of systems engineering and a technique of schematic webbing, both of which provide powerful tools for analyzing and discussing complex systems. These tools become indispensable for the technical research project.

Technical Research Project. Each team is assigned a technical research project that has been designed to fulfill four purposes.

- First, the technical research project provides participants with a focused opportunity to build positive team cooperation.

- Second, it gives teams an opportunity to examine a large system with both technological and sociological components. This systems analysis experience helps educators understand the functioning of and change process in educational systems.

- Third, it provides documentation and experience in cooperating or working with organizations outside the schools or school systems. While conducting their research, participants have the opportunity to explore the rich educational potential of local resources that are often overlooked.

- Fourth, it is an example of an educational approach that blends aspects of science, mathematics, and the humanities quite naturally. Technologies arise as cultural responses to a societal need. Communities generally have a range of technologies from which to choose, and they base their choice on more than science and mathematics: economics, politics, ethics, history, and culture also play a role.

To date, teams have been assigned a specific technical research project. It takes a substantial amount of lead time to develop the projects and to establish human resources in the pertinent businesses and organizations. Because the identity of the teams participating in the program is often unknown when the projects are developed, the Design Team has been unable to tailor projects for individual teams.

In the technical research project, each team researches a facet of or piece of equipment in a large-scale technological system that helps to support life in modern communities. Past TILT programs have looked at water and sewer, mass transit, construction, telecommunications, power generation, health care, commercial aviation, and commercial seafood production systems. The team's charge in the five-day project is to go on-location and investigate the subsystem embodied in the equipment

(see "Technical Research Project Charge to Teams" in the appendix). Team members are asked to understand the scientific and engineering principles of how the subsystem or equipment works. At the same time, they try to understand how people interact with it: who runs it; who works there; who the customers are; and who is affected directly or indirectly by it. Teams attempt to discover the historical and cultural factors that resulted in the equipment and the technology. They identify and appraise any trade-offs that may have been made. They judge how effectively the equipment serves its intended purpose. Learners naturally begin, in an approach like this, to develop scientific techniques and use mathematical and computational tools.

The technical research project culminates in a "trade show" at which teams demonstrate a teaching model of the equipment they studied, explain how it fits into the larger system of the technology, and report how they achieved their results. Reports of all the projects are printed and supplied to all teams as valuable starting points for project-based investigations in their home communities.

"Each team researches a facet of or piece of equipment in a large-scale technological system that helps to support life in modern communities."

Designing a Plan of Action. Each community team produces a plan of action for continued program implementation during the follow-up school year. Activities such as the Game of Change, a board game that simulates the efforts of educators within a school system to effect changes in the equity of education, help teams understand how to go about implementing the plans in their communities during the subsequent school year. Each team is asked to create a common mission, a team vision, and to articulate what it would like the relationship between its school and community to be (see "Charge to the Community Teams for the Upcoming Year" in the appendix). The teams consider questions such as these: What needs to happen in the community and in the school system to make respective resources available to each other? What intermediate steps need to be taken?

The Design Team has a long-range vision that students attending schools in communities with previous TILT participation will spend part of each day in an integrated, multidisciplinary program that focuses on the technology in the local community. A key step in achieving this goal is the formation of partnerships between educators and other members of the community, such as business and industry representatives. The professional development of educators through the type of technical research projects that are a central part of the three-week residential session provide a suitable context in which these partnerships can form and grow. The relationships developed in this way can become a forum for planning and conducting the type of student programs that are part of TILT's long-term vision.

Phase 5: School-Year Follow-up

At the end of the intensive July session, the community-based teams return home to implement their plans in the local schools and school systems. Teams leave with a draft of a strategic plan and a planning grant of $10,000. Using laptop computers on loan from TILT, teams share information with one another and with TILT staff via the electronic network America Online®. Once a month, teams converse formally with one another during a scheduled, evening "chat" session on the network.

Beginning in August and continuing throughout the following school year, the TILT Design Team (and occasionally an undergraduate facilitator) provides targeted assistance to each community team carrying out its community-based responsibilities. Assistance falls into four categories.

"The Design Team has a long-range vision that students attending schools in communities with previous TILT participation will spend part of each day in an integrated, multidisciplinary program that focuses on the technology in the local community."

· The TILT Design Team provides community teams with written materials. These include relevant descriptive and background materials that are printed in educational journals, prepared by Design Team members, or created by

other community teams.

- The Design Team members have telephone conversations with the community teams to answer specific questions or resolve specific concerns.

- Design Team members and some facilitators visit the community teams. During visits, Design Team members provide planning and technical assistance to community teams in the creation of community-based activities, make presentations to advocate for the program with others in the community, and participate actively in formal training workshops conducted in the community by the participating team. When physical visits are not possible, TILT arranges teleconferences with teams that have access to the appropriate communication facilities.

- TILT uses a commercial on-line service, America Online, to establish linkages among the participating teams and between the teams and the TILT Design Team. America Online access provides participants with a powerful and flexible means to communicate (using e-mail) and to access educational information or education-related forums on America Online and the Internet. In addition, America Online is used by the evaluation team to collect evaluation information during the school year.

Phase 6: Long-Term Support

Support of teams in the second and third years is currently under development. As more teams complete their intensive one-year involvement with TILT, categories of appropriate long-term support are expected to emerge. In one model, TILT has a three-year commitment to advise and work with a team in an urban school to integrate the academic and performing arts divisions of its school. It is helping this team learn how best to use its business partner in the necessary planning and negotiations. In another model, teams return to MIT's campus in the second year to develop technology-focused curriculum modules that

are based on technological systems, integrated across disciplines, centered on project learning activities, focused on teachers' communities, and heavily concentrated with hands-on and design activities.

Such curriculum can be used in both comprehensive high schools and middle schools. Each team generates the main focus of the curriculum and bases it on a technological system present in the community. Examples include road or transportation systems, hospitals, mail and package delivery systems, water and sewage systems, communications and media, theaters, public safety systems, urban renewal programs, and so on. Some of these systems are clearly specific to cities, but many of them are common to most communities. All are highly integrative, have some major technologies at their roots, lend themselves to project-based research and learning, and give students of any age a sense of how politics, technologies, and various social and economic factors interact.

For example, a former TILT team composed of teachers from a vocational school and faculty from a community college is developing a series of curriculum units with the tentative heading of "Medicine, Technology, and Society." The resulting curriculum is being used as part of a biotechnology career path, and the collaboration has expanded to include a second vocational school.

TILT Timeline

Phase 1: Evaluation and Planning weekly meetings			3-day planning retreat	Weekly meetings	Bi-weekly meetings
Phase 2: Recruitment of teams					Final team selection
					Phase 3: Facilitator Training First week in July
					Phase 4: Residential Session Last 3 weeks in July
Phase 5: School Year Follow-up	Debriefing meeting	Follow-up continues	Debriefing meeting	Follow-up continues	

Replicating TILT

The TILT model was explicitly designed to be replicated by the participating community-based teams. The TILT Design Team has also explored two other institutional avenues for replication: state departments of education and institutions of higher education. Although the perspectives and expertise brought to the replication process by each of these institutions differ, the resources required for replication are the same and include staff, site, materials and supplies, computers and communication, implementation, and evaluation costs.

Staff Costs. Core staff (equivalent to the TILT Design Team) are responsible for planning and implementing the model. At a minimum, the program requires three FTE staff members who recruit participants, design activities, and coordinate program logistics. Additional staff time is required as the number of participants and participating sites increase, the length of the program increases, and the goals and activities of the program become more ambitious. Besides core staff, facilitators are needed to work with teams of participants. Former program participants and undergraduate and graduate students from the local college are two sources for these staff. Finally, workshop specialists or consultants may be required to share their expertise regarding specific topics raised during the community-based workshops. The scope of the program agenda will dictate the level of need for these staff. The specialists or consultants and the facilitators may require a financial commitment.

Site Costs. A second category of resource commitments involves site costs. An off-site (that is, a site away from the school or community) is recommended to ensure a consistent focus on the program activities. A residential site is recommended because it allows reinforcing interactions to occur which strengthen bonds within the community team. Site costs could include rental fees and food, but community or institutional partners (particularly business and institutions of higher education) may be able to provide space to conduct the

sessions. Resources should also be allocated for several types of social activities, including those that introduce participants, celebrate the experience, and allow for a debriefing of the experience. Again, community or institutional partnerships can provide in-kind contributions to reduce the cost.

Materials and Supplies Costs. Several activities require that teams have tools to dismantle small objects, and the objects (such as wind-up toys) themselves need to be supplied. TILT also gives teams up to $150 to buy supplies during the technical research project portion of the program. Teams use this money to construct models for the "trade show" and to document their efforts.

Computers and Communications Costs. A fourth category of costs covers computers and communications. This includes the cost of computers for use by the local design team and for loan to the community teams, the cost of on-line services (if local e-mail and networking capacity does not exist), telephones and telephone lines for the core staff to allow regular access by participants, and mailing or copying costs associated with material preparation and distribution.

Implementation Costs. The fifth category involves participant implementation costs. These funds are typically used by participants to purchase release time, to develop or purchase materials, or to contract with outside consultants. TILT provides discretionary funding ($4,000 for each team; this is included in the $10,000 grant awarded each team upon completion of the three-week residential session) to enable TILT participants to identify and define their own funding priorities. This can serve as an empowerment tool for participating educators.

Evaluation Costs. Evaluation costs, the final cost category, include the cost of consulting time by an outside evaluator, staff time associated with internal assessments, and material for the purchase or preparation of evaluation instruments. Generally, evaluation costs

should be five to seven percent of the overall program budget. However, costs may be somewhat higher proportionately for relatively small programs.

All resource costs would be reduced for smaller target audiences or a smaller scope of activities. While some costs (space and materials) are closely associated with program size, others (local staff and evaluation costs) are somewhat less closely associated.

Appendix: Origins Of TILT

"I felt that there was a place in the freshman year where some students might want to think of science and engineering as components of a broader set of concerns,"

TILT is a year-long program that begins with a three-week, residential session in July. This initial phase focuses on professional development for teams of educators and supporters from various communities. These community-based teams develop and strengthen team-building skills, conduct an integrated, multidisciplinary technical research project, and begin planning for change in their communities. Teams leave the initial phase of TILT with a draft of a strategic plan, a computer on-loan, a planning grant, and the immediate charge to introduce their colleagues to TILT concepts. Linked through a commercial on-line service (American Online) throughout the following year, TILT personnel monitor, advise, and assist each team as its plan matures and unfolds.

The program has not always had this form, and a quick look at its history confirms its ability to adapt to changing situations and to participant responses. The seeds for TILT were contained within a technology-centered program first begun for MIT freshmen. In the mid-1980s, Professor Leon Trilling of MIT created the successful Integrated Studies Program, or ISP, for MIT freshmen. ISP focused on the pervasive role of technology in cultures. "I felt that there was a place in the freshman year where some students might want to think of science and engineering as components of a broader set of concerns," Trilling explains. "The cultural context of science and engineering is especially intriguing."

Professor Arthur Steinberg of MIT took over as director of ISP in 1988, bringing to the program a considerably more hands-on style. Professor Steinberg and Christopher Craig developed a year-long program within ISP called "Technologies and Cultures in Historical Perspective" in which MIT freshmen explore modules

on technologies that span cultures and time, such as cooking, weaving, blacksmithing, clocks, engines, telephones, and computers. Within each module, students enjoy the experience of using their hands—taking apart and reconstructing alarm clocks or engines, cooking meals, or weaving fabrics. ISP students work in teams and help one another, thereby learning how to work cooperatively.

1990. Steinberg and Craig conducted an experimental, week-long, curriculum-making workshop modeled on ISP and called it "Building an Integrated Curriculum." Like ISP, the workshop emphasized interdisciplinary and team-oriented educational approaches. Twenty bilingual education teachers from all levels of the Cambridge Public Schools (Massachusetts) formed working groups and created lesson plans on the products of a technology as it is practiced in their particular culture. "The experience of one teacher in particular was pivotal in the development of TILT," points out Craig. "She not only was reenergized by the experience of creating her own curriculum, her students inspired her to try to create curricula based on the city around them—Cambridge, Massachusetts."

1991. The idea of basing curricula on the surrounding city was carried out in "Building an Integrated Curriculum: A Workshop for Teachers in Vocational and Bilingual Education Programs." In one activity of this eight-day workshop, 53 teachers from across the country looked closely at Cambridge neighborhoods and their possibilities as focal points for developing curricula. Teachers worked in groups of two or three to develop curricular materials, lesson plans, hands-on exercises, experiments, and projects that were multidisciplinary as well as interdisciplinary. One group was particularly influential; it came as a "community team" that included an administrator as well as teachers. This group created a ten-week module for ninth-grade students that centered on their community and that challenged stu-

"The experience of one teacher in particular was pivotal in the development of TILT," points out Craig. "She not only was reenergized by the experience of creating her own curriculum, her students inspired her to try to create curricula based on the city around them—Cambridge, Massachusetts."

dents to apply the skills they learned in school to solve real problems in the community.

Independently, Professor Trilling conducted a two-week workshop that focused on the technologies that form a city's infrastructure. Twenty-two individual teachers from Boston and Cambridge investigated water treatment and delivery technologies in particular, considering not only the scientific aspects of the technologies, but also the societal and humanistic aspects. This workshop emphasized the idea of "systems," that a piece of technology exists as a component in a larger network of interrelated technologies, social policies, cultural practices, economic structures, physical environments, etc. Craig lent his experience and expertise in designing hands-on activities to this workshop, and MIT undergraduate students served as technical instructors. During the last three days of the workshop, teachers wrote interdisciplinary curriculum modules on water treatment and delivery, which they then were to test in their classrooms the following semester. Workshop staff visited a number of classrooms engaged in these interdisciplinary activities during the school year.

1992. The complementary strands of community-centered and technology-based projects were woven together when Chris Craig, Professor Trilling, and Alan Dyson joined forces to conduct a three-week workshop called "How a City Works," the prototype for TILT. Fifty individual teachers of science, math, and social studies from the Boston and the Cambridge Public Schools attended the workshop and studied either water treatment and distribution or mass transportation. Within each subject matter, teachers were further organized into study groups, and each group was assigned a mentor or expert in the subject and an MIT undergraduate student. The program's first two weeks took place on MIT's campus. Lectures laid the groundwork for a research project based on the assigned technology in the second week. The third week

"Teachers from Boston and Cambridge investigated water treatment and delivery technologies in particular, considering not only the scientific aspects of the technologies, but also the societal and humanistic aspects."

each teacher returned to his or her community to continue researching the technology as it appeared in that community. A formal evaluation was added to the program to assess its strengths, weaknesses, and effects.

1993. "How a City Works" was changed to accept only community-based teams of teachers. Experience from the previous year's teams proved that individual teachers lacked the support necessary to nurture and maintain their efforts at reform. "But in the case when two individuals came from a school," Dyson explains, "it was quite clear that there was a synergy there that they could build on." A math teacher and a social studies teacher from a elementary school in Cambridge, for example, began to plan technical projects together for their seventh- and eighth-grade students. They brought in Harvard University interns to help them, and within a year they had a program up and running that placed all their students with businesses in the community for one week. Students were charged with investigating how each business used mathematics, spreadsheets, and computer database software in its day-to-day activities. Throughout the week, students gathered data and asked questions prompted by a carefully constructed script. Students then used spreadsheets or computer database software to analyze the data in a variety of ways.

Ten teams from across the country engaged in three weeks of research, with each team assigned to examine either construction or communications technologies. Teams were no longer assigned to an expert mentor: "We found," says Dyson, "that teachers, when faced with an MIT professor, tended to simply want to sit and take notes and not search for data or collect data. It became clear that while the projects needed to be designed in consultation with experts, experts were not very good at guiding the investigations of teachers who were not very familiar with science and math." Instead, a former participant or TILT staff member and an MIT undergraduate student were assigned to each team to guide its investigations.

Another change was to keep the teams on campus for the research phase. Teams showed that they had difficulty conducting research on their own during the month of August. "We spent all of August fielding a whole variety of questions from frustrated teachers, frustrated because half the members of their study group were on vacation, and when they came back, the other half were on vacation," explains Dyson. "There was no sense of team, no sense of sharing information, no thinking it through together. It became a team in name only, with individuals collecting information, sending it to one person who agreed to put it in a report. And we lost the whole flavor of a group of people who were working on a project, sharing information and checking it out, and questioning each other."

In a major departure from the previous workshops, teachers did not write curricula; instead, they were expected to attend the workshop as adult learners to improve their own professional skills. Visits to technological sites and a series of lectures laid the groundwork for the teams' subsequent research. At the end of the three weeks, teams presented the results of their work in a "research fair," which was similar to a science fair. Each team left MIT with the charge to plan and conduct a comparable institute in its home community.

1994. "How a City Works" was renamed "The Institute for Learning and Teaching," TILT, to avoid confusion with a similarly named program in the Cambridge Public Schools. The Design Team recognized that teams of teachers were essential but not sufficient to nurture substantial change; teachers needed the support of both the school administration and the community outside their schools. Therefore, teams this year were required to include both a school administrator responsible for some or all of the teachers and a champion from the community surrounding the school—a parent, a school board member, an elected town official, a business representative, a university or college faculty member or student, and so on. The Design Team and the program evaluators both realized that with the concept of teams comes the necessity for team building.

Unlike individual research and design, team research and design is a series of negotiations. Teams need more than a mere guide for their research; they need a "facilitator" to help them develop negotiation and communication skills and to better understand group dynamics. To prepare the "facilitators," TILT began a formal, three-day training program to demonstrate how the role of a facilitator is different from that of a mentor or an expert. Time was set aside in each day's schedule to allow teams to reflect and debrief on the group dynamics that occurred during each activity.

Seven community-based teams attended three weeks of team-building exercises (physical Outward Bound-type, intellectual-type, design-type), team research, and team planning. Traditional lectures were reduced in number, and no activities, other than the opening picnic and closing banquet, were scheduled for the evenings. The community teams stayed together only for the team-building and team-planning phases of the institute; during the research phase, they were reorganized to form new teams so that individuals could experiment with new roles outside the established patterns of their schools or communities. Teams were assigned a technical project within either power generation or health care technologies. The research fair in 1993 had fostered too much competition amongst the groups, therefore in 1994 the results of the research were shared in a number of simultaneous seminars conducted by two members of each research team. The remaining members attended the other seminars and were encouraged to share what they had learned with their colleagues.

At the end of the three weeks, teams were given the mandate to create a community of learners in their communities using the skills and techniques that they had learned in TILT. During the last week on campus, they had begun the planning process and a draft outline of what they wanted to accomplish.

To prepare the "facilitators," TILT began a formal, three-day training program to demonstrate how the role of a facilitator is different from that of a mentor or an expert.

1995. TILT's most recent model contains some changes from the 1994 version. Eight teams, all but one of them community-based, attended the 1995 program. The exception was a team sponsored by the Massachusetts School-to-Work Program; this team consisted of one high school teacher, two community college faculty, and program staff in the CS2 (Communities and Schools for Career Success) Program. School administrators were encouraged to attend the entire three weeks, but required to attend only the first and third weeks. This was a change from the previous year's program, which required administrators' attendance only in the third week for the planning process. The Design Team recognized that administrators who did not experience TILT team-building with their teams were at a disadvantage when trying to plan TILT activities for their colleagues back home.

Another change was to keep community teams together throughout the entire three weeks. The technical research project was no longer segregated as a discrete unit in the second week, but was integrated throughout the entire three weeks. Teams in 1995 were assigned technical research topics in either commercial aviation or commercial seafood production. Team research results were presented during a "technology trade show" during which teams demonstrated the models of equipment or processes that they had constructed. Immediately following the trade show was a colloquium that centered on discussions contrasting and comparing the changes in these two technologies with changes in the educational system. The purpose of the colloquium was threefold: to diffuse further the competition that naturally arises between teams, to foster the sharing of information, and to provide a different way of viewing the forces affecting the educational system.

To conduct the three-week residential session, TILT forms a number of relationships and partnerships with businesses and other organizations. During the 1994-95 school year, the Design Team realized that these partnerships remained largely invisible to the community teams. When teams returned to their commu-

nities, they had difficulty envisioning, much less establishing, productive relationships with the businesses and organizations in their locale. One change in the 1995 program, therefore, was to make these relationships much more visible, and to talk about the variety of partnerships possible with a range of viewpoints, from that of an industrial representative to that of a school superintendent and a Design Team member. At the end of the three weeks, teams were charged with forming partnerships in their communities. Drafts of their plans had to include lists of potential partners.

The Design Team also recognized after the 1994 program that teams did not understand the way in which team membership is dynamic; each team must expect its members to come and go. "The Design Team membership is always in transition," says Dyson. "The interests of individuals change as the team evolves. Members may leave when the institute focuses on a particular piece, and they may return when it moves to focus on another piece." Community teams must also expect that their membership will change. Teams left MIT in 1995 with the charge to "buddy up," to find other individuals in the community with an interest in educational reform and a willingness to become team members.

New in 1995 is a three-year commitment to two community teams. One team is supported through the federal Goals 2000 program; the other, by a private foundation. The former will return to TILT in the summer of 1996 to develop technology-centered curriculum units; the latter is reorganizing the structure of vocational education in Worcester, Massachusetts.

"The Design Team membership is always in transition, the interests of individuals change as the team evolves."

The Institute for Learning and Teaching

Application 1995

Teams must fill out **one** form only. Please type or print clearly. Fill in **all** blanks.

Team Member #1

Last Name _____ First Name _____ M. I. _____ Home Phone Number _____

Home Street Address _____ City _____ State _____ ZipCode _____ Work Phone Number _____

Check One: ☐ Teacher ☐ School Administrator ☐ Other (business rep., university rep., etc.)

Name of School or Business: _____

Work Address _____ City _____ State _____ Zip Code _____

Subject(s) Taught: _____ Grade Level(s) Taught: _____

Course(s) Taught & Its (Their) Focus:

Team Member #2

Last Name _____ First Name _____ M. I. _____ Phone Number _____

Street Address _____ City _____ State _____ ZipCode _____ Work Phone Number _____

Check One: ☐ Teacher ☐ School Administrator ☐ Other (business rep., university rep., etc.)

Name of School or Business: _____

Work Address _____ City _____ State _____ Zip Code _____

Subject(s) Taught: _____ Grade Level(s) Taught: _____

Course(s) Taught & Its (Their) Focus:

Team Member #3

Last Name _____ First Name _____ M. I. _____ Phone Number _____

Street Address _____ City _____ State _____ ZipCode _____ Work Phone Number _____

Check One: ☐ Teacher ☐ School Administrator ☐ Other (business rep., university rep., etc.)

Name of School or Business: _____

Work Address _____ City _____ State _____ Zip Code _____

Subject(s) Taught: _____ Grade Level(s) Taught: _____

Course(s) Taught & Its (Their) Focus:

Team Member #4

Last Name _____ First Name _____ M. I. _____ Phone Number _____

Street Address _____ City _____ State _____ ZipCode _____ Work Phone Number _____

Check One: ☐ Teacher ☐ School Administrator ☐ Other (business rep., university rep., etc.)

Name of School or Business: _____

Work Address _____ City _____ State _____ Zip Code _____

Subject(s) Taught: _____ Grade Level(s) Taught: _____

Course(s) Taught & Its (Their) Focus:

Team Member #5

Last Name _____ First Name _____ M. I. _____ Phone Number _____

Street Address _____ City _____ State _____ ZipCode _____ Work Phone Number _____

Check One: ☐ Teacher ☐ School Administrator ☐ Other (business rep., university rep., etc.)

Name of School or Business: _____

Work Address _____ City _____ State _____ Zip Code _____

Subject(s) Taught: _____ Grade Level(s) Taught: _____

Course(s) Taught & Its (Their) Focus:

Team Member #6

Last Name _____ First Name _____ M. I. _____ Phone Number _____

Street Address _____ City _____ State _____ ZipCode _____ Work Phone Number _____

Check One: ☐ Teacher ☐ School Administrator ☐ Other (business rep., university rep., etc.)

Name of School or Business: _____

Work Address _____ City _____ State _____ Zip Code _____

Subject(s) Taught: _____ Grade Level(s) Taught: _____

Course(s) Taught & Its (Their) Focus:

Team Member #7

Last Name _____ First Name _____ M. I. _____ Phone Number _____

Street Address _____ City _____ State _____ ZipCode _____ Work Phone Number _____

Check One: ☐ Teacher ☐ School Administrator ☐ Other (business rep., university rep., etc.)

Name of School or Business: _____

Work Address _____ City _____ State _____ Zip Code _____

Subject(s) Taught: _____ Grade Level(s) Taught: _____

Course(s) Taught & Its (Their) Focus:

The person who will act as contact for the team is _____

Telephone: _____

FAX #: _____

email address: _____

Best time of the day to contact by voice: _____

The Institute for Learning and Teaching - 1995

Technical Research Project Charge to Teams

1. Model building	Build a working model of an important piece of the technology your team has studied during this phase of TILT.
2. Debriefing	(see next page)
3. Short paper	Each team produces a short paper (have 75 copies on hand for your colleagues on other teams) (length-no more than 4/5 pages-double spaced) Focus-What does your team know now about the technical aspects of your socio-technological project, i.e., the science, math and technology.
4. Social web	Using "Inspiration", create a web showing how you see the relationships between the technology, people, culture, and politics at your site, i.e., what does the system look like?

Debriefing - At the beginning of week three.

Two or three members of each team will give an oral 4 min. executive summary of their team's work. All members of all teams will be presenters, but not in the same forum. We will have 3 groups going on at the same time.

Following the presentations, facilitators will ask:

Group I Questions

- How can consumers get what they need from commercial fisheries or commercial aviation? (the political process)
- What is the relationship between cost and human safety in the fisheries and aviation business? (be ready with examples)
- What are the trade -offs between performance and safety in fisheries and aviation?
- What are the trade -offs between environmental/ecological concerns and cost/profits in fisheries and aviation?

Group II Questions

- How are these research project experiences related to the educational system you are familiar with?
- What are the trade -offs in your system? Safety, cost/profit, performance
- Do you see a paradigm shift taking place in K-12 education? your school system?

Lastly, all research teams will reassemble to debrief and reflect.

The Institute for Learning and Teaching – 1995

Charge to the Community Teams for the Upcoming Year

"One of the long-term visions that the TILT Design Team has for the school systems we are involved with is that students there spend part of each day involved in an integrated program which focuses on the technology in the local community. These programs should integrate the disciplines of the sciences and the humanities through a hands-on approach to real world systems that directly affect the students and others in the community. This would be one of the characteristics of a community united within the process of education.

A key step in achieving this goal is the formation of partnerships within the community between educators and business people which are able to access the entire spectrum of resources actually available rather than limiting themselves to requests for money. The professional development of educators through the type of technical research projects that are a central part of the TILT summer program provide a good context in which these partnerships can form and grow. The relationships developed in this way between educators and other members of the community can become a forum for planning and implementing the type of programs for students that are part of our long- term vision."

The charge that the TILT Design Team gives to each of the community teams which attend this year's workshop is to begin the task of establishing some of these partnerships and using them to acquaint your colleagues with the type of professional development that you have experienced this July and engage them in technical research projects at local sites. We will suggest some exercises to help you begin this process, but the specific details must come from the knowledge and expertise that your team holds. While your facilitators will be with you as you start the process, remember that you will be making most of the

journey on your own. This task will provide the ultimate test of how well you have come together and are able to work as a team, as well as a way to show who you are and what you can do.

First stage, planning process: Tuesday, July 25-1:30 PM

Exercise #1. Brainstorming of community resources (Allow 1 hour)

Step 1. Make a web which includes all elements of your community and which indicates the ways in which they are interconnected. Show which of these elements are currently connected to the school, and which you would like to become connected in the future. The goal for this part of the exercise is think as widely as possible and be sure that everyone in your community is represented on this web.

Step 2. Identify and list the resources available from the elements of the community listed on your web. The challenge here is to be as creative and flexible as you can about the way you think of resources here - money is only the least creative and most obvious one. At the same time, be realistic about the needs of the people you are thinking about and what they will reasonably be able to provide.

Exercise #2. Brainstorming of school needs (Allow 1 hour)

Step 1. Make a web which lists all of the services that your school could possibly offer to the community and shows how these services connect to each other. You might refer to the first web you made in the previous exercise to see how your service web might grow. (For example: Are there services that you currently provide for children that might also benefit the elderly or some other group?)

Step 2. Identify and list the additional resources that are needed to allow your school to provide the services that you have listed on your second web of services.

The information that you collect in these two exercises will be a valuable starting point for planning your next moves. Take a

break at this point and relax. Reflect as a group on what has happened, and let what you have discovered today sink in. Start fresh tomorrow.

Second stage, planning process: Wednesday, July 26–1:30 PM

Exercise #1. Creation of a Team Vision (Allow 90 minutes)

One of the toughest jobs for any new team is to agree on a common mission or vision. This is a very important step for any team to take, but it often requires negotiation which can put a strain on a group of people who are new to each other. One method which can be very helpful in this situation, as well as many other situations which require groups to reach consensus, is Nominal Group Technique.

Use Nominal Group Technique to determine the major elements of your team's Vision Statement. Each member of your team, on their own, first writes down about 6 statements which they feel should be included in the team's vision. The facilitator will then collect and number these statements by going around the team, asking each member for one statement at a time, and continuing until everyone is finished. Only requests for clarification of each statement are possible at this point - there can be no discussion of the relative merits of each idea!

Once all of the suggestions have been collected and everyone on the team is clear on what they mean, the members of the team will vote on the statements. Count the total number of statements, and each team member will vote for half of the total number of statements plus one, giving their first choice that number of points and each subsequent choice one fewer points until they have run out of votes. (For example, if there are 25 suggestions, each person would vote for 13. They would then give 13 points to their favorite suggestion, 12 to their next favorite, then 11 and so on down to 1.)

Collect all votes and add up the number of points received by each suggestion. Also note the number of first place votes each suggestion received. This will result in a relatively neutral consensus of the most important points for your team's vision statement. You might then let

each team member attempt to combine these statements and write a finished statement.

Exercise #2. Visualization of long range goals (Allow 1 hour)

In this exercise, you will need to think forward ten years into the future of your community. You might begin by closing your eyes for a few minutes and simply imagining what might happen over the next decade. Then ask yourself what would need to happen in the community and the school system in order for the services that you have listed in the initial exercises to be available to the community.

This is a different matter from a list of services. In this step you need to describe the type of organization and communications which are necessary to provide the services. The result will be a long range picture of the sort of partnership between the community and the schools which you would like to create.

The two exercises that you went through today have provided you with a statement of your team's vision as well as a specific articulation of what sort of future would meet that vision. This is a good point to break for the day and reflect on what you have done. Give the ideas that came up today a chance to mix with those from yesterday. Continue your planning in the morning.

Third stage, planning process: Thursday, July 27-9:00 AM

Exercise #1. Describe intermediate stages (Allow 1 hour)

Once you have determined what things must look like ten years in the future, ask yourself what the intermediate stages must be. Begin with five years in the future - what will have to be in place in five years in order for your ten year goals to be realized? Then repeat this process for three years and then one year in the future.

Now you have a series of snapshots of the type of organization that you need to create in the community in order to revitalize the connection between the school and the community. The remaining work is determining the methods by which you will accomplish it.

Exercise #2 Specific strategies to get started:

Talk to Establish an initial list of people to inform about your efforts immediately after returning home. This list should include colleagues who you feel will be interested and wish to become involved, administrators who might support your efforts, parents, members of local government, and business people who might be able to host research projects. These people should be contacted and informed through group or individual meetings.

Buddy up Each member of your team should find a buddy to bring onto the team when you get home. The buddy should be from a different line of work - i.e. teachers buddy up with people outside the school system and community reps buddy up with other teachers or administrators. Increasing the number of people involved in and contributing to your efforts can only make things easier at this stage. These buddies should be people you will talk to regularly and share ideas with.

Projects In order to provide the professional development experience to your colleagues, set up research projects for teams of teachers to carry out. Make these projects the center of a process which brings your colleagues together, informs them of what you saw and heard at TILT, and engages them in projects focused on local technological sites.

Timeline Lay out a schedule for the upcoming year and begin to identify the events that need to be placed on it and when they should take place. This will be an important tool in keeping your efforts on track once you the school year has started.

Write up the planning process: Thursday, July 27–1:30 PM

Before you leave today, your team must write up and hand in copies of all of your planning materials to the TILT Design Team. These should include:

- A cover page which lists the members of your team and includes the statement of vision.
- The web of your community & list of resources in the community.
- The web of services which your school might provide to your community and the list of additional resources needed to realize this.
- Descriptions of your ideal community of the future in ten years and the intermediate stages you have visualized.
- Descriptions of your plans for immediate steps upon returning to your community including people to talk to, who you are considering for buddies, which sites you plan to approach for technical projects.
- A timeline of your plans for the upcoming year and a preliminary budget for your $4000 in discretionary funds.
- A statement of your expectations of the MIT Design Team for support and follow up for the future.

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